PERSONAL & SOCIAL CAPABILITIES

Ways to integrate Higher Order Thinking Skills into primary and secondary education

Higher order thinking skills are those that enable learners to think critically, going beyond observation and memorization of facts. Developing strong core critical thinking skills in primary and secondary education leads to better learner engagement, academic progress, and future success in the workplace.

Many teachers may be familiar with Bloom's taxonomy as a resource for focusing on higher order thinking skills. It identifies the skills as:

• **Analyzing** – collecting, examining, and organizing information and evidence.

• **Evaluating** – making judgements, critiquing; identifying strengths and weaknesses.

• **Creating** – synthesizing across information or sources of evidence to draw a conclusion, generate something new, or make an improvement.

Below are some example learning tasks to give you inspiration for how students can develop and practice the different higher order thinking skills in the classroom.

Subject	Learning activity	Skill(s) involved
Math	Present students with a mathematical proof provided by a hypothetical student. Have the students critique the reasoning used by the hypothetical students.	Evaluating
	Students examine the effectiveness of different ways to present data using graphs.[1]	Evaluating
	Students investigate several competing cell phone plans, write and graph linear equations to model the plans, and select the one that gives the best value for a certain set of criteria.	Analyzing, Evaluating
Science	Students are presented with three observations from a science experiment. They are then asked to draw a conclusion and explain which observations support their conclusion and why.[2]	Creating
	Based on information in two graphs, students determine how increases in ocean temperature would impact global temperatures and justify their decisions.[3]	Creating
English Literature	Students read the novel, consider whether the main character is a hero or a villain, and write an argument supporting their opinion.	Evaluating, Creating
History	Students research and develop an argument for how advances in science and human knowledge inspired political revolutions in Europe and North America during the 17th and 18th centuries.	Analyzing, Evaluating, Creating
Language teaching	Students say which hobby they like and provide one reason why, using simple language.	Evaluating, Creating
	Students read a number of different texts in which the language is controlled, giving them information about the tourist attractions in a particular town. They then plan a class visit, taking into consideration price, time available, class interests etc.	Analyzing, Creating
	Students carry out online searches to research the arguments for and against school uniforms. They synthesize their findings and use these to build their own evidence-based stance.	Analyzing, Evaluating, Creating

1 Crowe, A., Dirks, C., & Wenderoth, M.P. (2008). *Biology in bloom: Implementing Bloom's taxonomy to enhance students learning in biology.* CBE Life Sciences Education, 7(4), 368-381.

2 Osborne, J/F., Hunderson. J.B., MacPherson, A., Szu, E., Wild, A., & Yao, S. (2016). *The development and validation of a learning progression for argumentation in science.* Journal of Research in Science Teaching, 53(6), 821 – 846.

3 Lee, H., Liu, O.L., Pallant, A., Roohr, K.C., Pryputniewicz, S., & Buck, Z.E. (2014) *Assessment of uncertainty-infused scientific argumentation.* Journal of Research in Science Teaching, 51(5), 581 – 605.

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Now that you have some examples, use the guidance below to devise your own learning experiences to enhance higher order thinking in your classroom.

Define, discuss, and model higher order thinking skills directly with learners

Many learners may be unfamiliar with the term 'Higher Order Thinking Skills'. Additionally, this term has different meanings, both in education and colloquially. It is important that teachers make it clear to learners when they are using these skills and what you mean by them.

1. Through "think alouds", explicit instruction, and examples, teach learners what good higher order thinking skills look like in terms of desirable behaviors and useful strategies.

2. Name and label higher order thinking skills when learners engage in them, so they begin to develop a vocabulary around these skills.

3. Provide learners with clear opportunities to practice their higher order thinking skills with your support, and give them feedback on their performance.

Teach higher order thinking skills in a way that is appropriate for learners' developmental levels

In some cases, learners' ability to demonstrate higher order thinking skills will be dependent on their level of cognitive development as well as their vocabulary, reading, and writing skills. It is important to keep these considerations in mind when developing activities.

1. The youngest learners can begin developing higher order thinking skills by distinguishing fact and opinion, supporting opinions with evidence, and considering whether information is relevant to solve a problem.

2. Later, learners can construct paragraph or multi- paragraph arguments and consider the quality of information used to solve a problem.

3. More advanced students are increasingly able to take an objective, logical, and nuanced stance to drawing conclusions from evidence and critiquing evidence and arguments.

Scaffold learners' practice of higher order thinking skills

Teachers can scaffold higher order thinking skills by utilizing the Gradual Release of Responsibility model – "I do, we do, you do". This strategy allows learners to develop competence with and confidence in their ability to use higher order thinking skills.

1. First, complete a task, explaining the higher order thinking skills used as you go along ("I do").

2. Next, the learners follow along during the task ("We do").

3. Finally, learners complete the task on their own, getting assistance and support only when needed ("You do").

Teach learners how to ask good questions when examining evidence and drawing conclusions

One of the main goals of higher order thinking skills instruction is to get learners to internalize a questioning mindset when gathering and examining evidence and drawing conclusions.

1. Ask learners intentional and targeted questions that elicit higher order thinking skills, e.g. What evidence supports your point? How might you look at the issue differently than someone else? What information isn't relevant to the question?

2. Present learners with content that poses contradictions and inconsistencies and evokes cognitive conflict (i.e., challenges deeply-held assumptions). This type of content will allow for thoughtful and deep discussions that facilitate higher order thinking skills.

3. Give students practice identifying concepts that can weaken arguments (e.g. logical fallacies [attacking the individual rather than the argument or oversimplifying an opponent's position], correlation versus causation [assuming that because there is a correlation between variables, one must be caused by the other], presence of confounding variables [an extra variable that has not been accounted for that influences the result]).

Incorporate inquiry–based assignments to teach and assess higher order thinking skills

Inquiry-based assignments provide learners with meaningful and challenging questions or problems. They allow learners to take self-directed initiative in investigating and exploring problems, and require learners to integrate and synthesize information in order to develop and justify a solution idea.

1. These assignments should require learners to explore authentic problems that are complex and do not have clear right or wrong answers.

2. These assignments can also incorporate writing and provide learners with evidence on an issue (i.e. documents or articles) that must be critically synthesized, organized, and evaluated in order to support a decision or conclusion on the issue.

3. Rubrics are useful tools for scoring these types of assignments and providing learners with feedback on their use of higher order thinking skills.

Are you already incorporating higher order thinking instruction in your teaching? Tell us how. **efficacy@pearson.com**